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Measuring Medical Students' Empathy: Exploring the Underlying Constructs of and Associations Between, Two Widely Used Self-Report Instruments in Five Countries.

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Abstract

Purpose: Understanding medical student empathy is important to future patient care.

However the definition and development of clinical empathy remain unclear. The authors sought to examine the underlying constructs of two of the most widely used self-report instruments: Davis's Interpersonal Reactivity Index (IRI) and the Jefferson Scale of Empathy (Student version) JSE-S, and the distinctions and associations between these instruments.

Method: Between 2007 and 2014, the IRI and JSE-S were administered in three separate studies in five countries, (Brazil, Ireland, New Zealand, Portugal and the United Kingdom). Data from 3069 undergraduate medical students were collected. Exploratory factor analyses, correlation analyses and multiple linear regression analyses were performed.

Results: Exploratory Factor Analysis yielded identical results in each country, confirming the subscale structures of each instrument. Results of correlation analyses indicated significant but weak correlations ($r=.313$) between the total IRI and JSE-S scores. All inter-correlations of IRI and JSE-S subscale scores were statistically significant but also weak (range $r=-.040$ - $r=.306$). Multiple linear regression models revealed that the IRI subscales were weak predictors of all JSE-S subscale and total scores. The IRI subscales explained between 8.9% and 15.3% of variance for JSE-S subscales and 19.4% for JSE-S total score.

Conclusions: The IRI and JSE-S are only weakly related, suggesting that they may measure different constructs. There is a need for more studies using both instruments, involving students at different stages in their medical education, and for more

60 longitudinal and qualitative studies in order to understand the practical implications of
61 this distinction.

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Introduction

Empathy is a core element in patient care. It may enhance patients' satisfaction, and trust, so facilitating compliance and adherence to therapy.¹⁻⁴ Receipt of empathy may be therapeutic in its own right.⁵⁻⁷ Greater trust by the patient may encourage better exchange of information in consultations so facilitating diagnosis and shared decision making.^{1,4,8, 9} From the doctor's perspective, empathy may lead to better clinical decisions,¹⁰⁻¹³ greater job satisfaction, and enhanced psychological well-being.^{9, 12-15} The development of empathy among medical students would seem crucial to future patient care.

However "clinical empathy" is poorly defined and measured,^{9,16-18} It has been seen as the ability to:

1. understand the patient's situation, perspective and feelings (and their attached meanings),
2. communicate that understanding and check its accuracy,
3. act on that understanding with the patient in a helpful (therapeutic) way.¹⁹

This definition implies a multi-dimensional construct incorporating affective, cognitive, behavioural and moral components.

For patients it is the empathetic behaviour they receive which is important. However asking patients to assess medical students' empathy is problematic and studies using simulated or standardised patients have produced mixed results.²⁰⁻²² Most studies of medical student empathy rely on self-report measures, rather than direct observations.¹⁸ The most widely used self-report instruments are Davis's Interpersonal Reactivity Index (IRI) and the Jefferson Scale of Empathy (Student version) JSE- S.^{23,24}

Davis considered empathy to be a set of related constructs, concerning responsiveness to others, but each discriminable from each other.²³ The IRI comprises 28 items (9 negative) forming four, 7-item, subscales: Perspective Taking (IRI-PT) assessing consideration for the psychological point of view of the other person; Empathetic Concern (IRI-EC) assessing consideration for their feelings and concerns; Personal Distress (IRI-PD) assessing personal anxiety in tense interpersonal settings and Fantasy Scale (IRI-FS) assessing tendencies to transpose oneself imaginatively into the feelings and actions of fictional characters.²³ IRI-EC and IRI-PT have been seen as “other-oriented” and IRI-PD and IRI-FS as “self-oriented”.^{25,26} IRI-EC and IRI-PD relate to affective aspects while IRI-PT and IRI-FS to cognitive or imaginative aspects. Respondents rate the extent to which statements apply, from “Does not describe me very well” to “Describes me very well” on a 5-point Likert scale.

The IRI has been used in a wide variety of contexts including neurological studies,²⁷ clinical conditions^{28,29} and criminology.³⁰ It has good psychometric properties and is regarded a valid, and reliable instrument for measuring empathy.³¹ Although less well used with medical students the factorial structure proposed by Davis has been supported in studies among adults and college students.^{31, 32}

The JSE was developed as measure of empathy applicable to patient care.²⁴ The 20 items in this scale form three underlying factors: Perspective Taking (10 positively worded), Compassionate Care (8 negatively worded) and Standing in the Patient’s Shoes (2 negatively worded). Most studies of medical student empathy report only the total JSE-S score.³³ Respondents rate their level of agreement with each statement on an ascending 7-point Likert scale (1 to 7). Used in a variety of cultural settings for

110 assessing the empathy of medical students, nurses and other healthcare students its
111 validity and reliability have been well supported.^{18,34-38}

112 Among healthcare students and practitioners the IRI subscales commonly used are the
113 “other-oriented” scales of IRI-EC and IRI-PT.^{39,40} The distinction between cognitive
114 and affective components is less clear in the JSE-S with both “Standing in the patient’s
115 shoes” and “Perspective Taking” appearing to reflect the cognitive component of
116 empathy.⁴¹

117 The IRI and JSE-S were conceived with different populations in mind. The IRI is

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118 applicable to the general population and seen to reflect generic or dispositional

119 empathy.²³ The JSE is applicable to those engaged in healthcare and hence seen to

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120 measure empathy specific to that context.²⁴ Studies of undergraduate medical students

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121 in different countries using the IRI have shown that they fall within the norms for the

122 IRI-EC and IRI-PT.⁴² It would seem reasonable to expect moderate associations

123 between some of the IRI and JSE-S subscales. A study of medical students found a

124 moderate correlation between the total scores of the JSE-S and IRI ($r = .45, p < .01$).⁴³

125 However, unlike the JSE-S, the IRI subscales are not normally summed to a total

126 score.¹⁸

127 To consider the underlying structural and conceptual differences of the IRI and JSE-S

128 this study asked:

129 1] Whether the latent or underlying factorial structures of the IRI and JSE-S
130 reflected the dimensional constructs of empathy indicated by their respective
131 subscales.

132 2] How the scales related to each other in terms of their total and subscale
133 scores.

3] Whether scores on the IRI as a generic measure of empathy predicted scores on the JSE-S as a measure of empathy specific for healthcare.

Method

Data were obtained from three separate studies.

Study one included data from 16 UK medical schools, one in Ireland and one in New Zealand. All students beginning and all students approaching the end of, their undergraduate medical education, were invited by email to participate in an international comparison. An online questionnaire survey took place between September 2013 and July 2014, and examined empathy, (IRI and JSE-S), psychological wellbeing, death anxiety and attitudes toward end of life care. Overall ethical approval was granted by the Psychology Research Ethics Committee of the University of Cambridge and by the relevant bodies in each participating school.

Study two was based in one Portuguese University. For each year between 2007 and 2014 students beginning their undergraduate medical education were invited to complete a paper questionnaire covering the JSE-S. In January and February 2013 students in all years were invited to complete a paper questionnaire covering the IRI. Data collection and storage were authorized by the Portuguese Commission for Data Protection (CNDP:10432/2011). Retrospective approval was obtained: - Subcomissão de ética para as Ciências da Vida, process SECVS - 071/2013.

Study three was undertaken in one university in Brazil. In 2011 and 2012, all undergraduate medical students in years 4 and 6 were invited to complete paper questionnaires covering both the IRI and JSE-S. Ethical approval was granted by the

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156 Research Ethics Committee in Human Beings at the Faculty of Medical Sciences of
157 Unicamp.

158 In all studies participants gave prior consent either in writing or online, and
159 participation was voluntary and anonymous with no incentives offered.

160 **Participants:**

161 **Table 1 here.**

162 [Medical schools in the studies offered “standard” courses lasting 5/6 years, with](#)
163 students typically aged 18 or 19 on entry. Some schools also offered 4 year accelerated
164 “graduate entry” courses for students typically aged 21 or over on entry who had
165 obtained a first degree.

166 The timing and balance of biomedical science and clinical course components of the
167 participating schools’ curricula varied. Some schools devoted the early years largely to
168 biomedical sciences, others adopted a more integrated approach. This study was not
169 able to examine detailed course content and structure.

170 The sample comprised 3,069 medical students (Table 1) of whom 2059 (67.1%) were
171 from the UK and 1887 (61.5%) were female. The majority of students, 2619 (89.1%),
172 had entered “standard” courses. A statistically significant, but small in terms of effect
173 size, difference in gender composition of samples in each country was found, with
174 proportionately fewer males among the Portuguese sample and proportionately more
175 males among the Brazilian sample. ($\chi^2_{(4, n=3069)} = 9.6, p = 0.047$, Cramer’s $V = 0.056$).

176 **Instruments:**

177 [We used the JSE-S \(student version\) in all countries. The IRI Portuguese version](#)
178 consists of 24 items as a result of a validation study which demonstrated factor loadings

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<.35 for items numbered 1, 15, 18 and high standardized residual for item 10.⁴⁴ We adjusted the item numbers of the 28 item IRI used in other countries to those of the Portuguese version to allow IRI data to be merged.

Data analysis and modelling strategy:

We merged the JSE-S and IRI items and converted them into in the same scale using z scores. We used exploratory factor analysis (EFA) to explore the factorial structure of all IRI and JSE-S items, using the scree plot, the Kaiser's eigenvalue > 1 method and Parallel Analysis (PA) to explore the optimal number of factors and principal axis factoring (PAF) with oblimin rotation. We used Cronbach's Alpha to measure internal consistency and Pearson correlation coefficient to examine associations between subscale and total scores of each scale. We examined the effects of country and gender on subscales scores using MANOVA and on the total JSE-S scores using ANOVA. (These results are presented in the appendix.) We used multiple linear regression to examine the extent to which IRI scores predicted JSE-S total and subscale scores with IRI subscale scores, country, gender and entry scheme being independent variables. Data analyses were performed using IBM SPSS Statistics v22 and the R. Commander⁴⁵ and the *psych* package.⁴⁶ We considered P values of 5% as significant and interpreted effect sizes according to values given by Cohen (1988).⁴⁷

Results

Latent dimensions of the IRI and JSE-S:

Table 2 here.

An EFA performed on the combined IRI and JSE-S datasets z scores, resulted a **nine** factor solution according to the Kaiser's eigenvalue >1 method and an **eight** factor

solution according to the PA and scree plot analysis (the line straightened after the eighth factor). Both solutions produced some dimensions with critical internal consistency values (Cronbach's alphas lower than 0.60). Therefore, the theoretically anticipated solution of **seven** factors accounting for 44.6% of variance was tested and led to higher and more acceptable internal consistency values. For the final EFA **seven** factors solution, measures of appropriateness of factor analysis were checked including KMO = .873 and Bartlett's test ($\chi^2_{(946)} = 33016$, $p < .001$).

Considering the theoretical structure, a practical significance of 5% and an acceptable factor loading of ≥ 0.224 were found for all items. All items clustered as expected and recorded the highest loading on their original dimension with the exception of JSE-S item 14, which loaded higher onto JSE-PT than onto its original JSE-CC dimension. Nine items showed significant double loadings, but none crossed the two scales. In each of the five countries the seven factor structure revealed a satisfactory fit, (Table 2) with the exception for JSE-SPS dimensions in Ireland (Cronbach's alpha=0.472).

Pearson correlations for all IRI and JSE-S subscales:

Table 3 here

Within scale associations: For both the IRI and JSE-S correlations between each subscale score and the corresponding total score were statistically significant: for the IRI generally strong ($r = .431$ to $r = .712$), for the JSE-S, moderate ($r = .377$) to very strong ($r = .854$). Correlations between the subscales within each scale were significant but less strong. For the IRI these ranged from $r = .061$ between IRI-EC and IRI-PD to $r = .403$ between IRI-EC and IRI-PT. A negative association was found between IRI-PD and IRI-PT. For the JSE-S the range was $r = .114$ between JSE-SPS and JSE-PT and $r = .467$ between JSE-PT and JSE-CC.

Between scale associations: The correlation between total scores of JSE-S and IRI was positive and significant, but weak $r=.313$. All inter-correlations of JSE-S and IRI subscale scores were statistically significant but weak, ranging from $r=-.040$ (JSE-PT with IRI-PD) to $r=.306$ (JSE-PT with IRI-EC). The only exception was the non-significant, negative correlation between IRI-PD and JSE-CC ($r=-.016$). The correlations between the subscales scores of one scale and the total score of the other scale were also all statistically significant but weak. IRI-PD was negatively associated with all JSE-S subscales scores.

Multiple linear regression models:

Table 4 here.

The multiple linear regression analyses tested whether the IRI subscale scores, gender, country, and entry scheme significantly predicted JSE-S subscale and total scores. The reference categories were female, UK and standard entry (Table 4.) All regression models were significant, with a relatively low adjusted R squared, varying between 9.0% and 15.3% of explained variance for JSE-S subscales and 19.5% for JSE-S total score.

With the exception of IRI-PD, all IRI subscales were significant, positive, predictors of each JSE-S subscale. Gender, was significant in all regression models except for JSE-PT, with males presenting lower scores. The extent to which students in countries differed from those in the reference country (UK) varied between instruments and between subscales of each instrument. Overall students in Brazil differed most from those in the UK whereas students in Ireland differed least. Entry scheme was significant for JSE-SPS and for JSE-S total score with graduate entry students recording

higher scores than standard course students. The most pronounced predictor of total JSE-S score was IRI-EC.

Discussion

This study found that the dimensional structure of each instrument reflected its composite subscales with strong internal consistencies. The EFA results supported the cross-cultural construct validity and stability of both scales. For the IRI, our study confirmed Davis's 4 factor structure in 5 countries. To the authors' knowledge this factorial structure has been confirmed in studies of adults and college students, albeit with minor variations,^{31, 32} but never before among medical students. For the JSE, our results broadly accord with Hojat's original 3 factor structure and within that, the prominence of Perspective Taking (JSE-PT).²⁴ The only exception to this was the result for JSE-SPS in Ireland, possibly resulting from a combination of small sample size and small number of contributing items (n=2).

Our findings accord well with international JSE-S studies of medical students which broadly support the 3 factor structure and their respective relative importance^{37, 38} but with minor variations. For example studies of German and Japanese medical students support the JSE-PT construct but report variations in JSE-CC, possibly attributable to cultural differences.^{37,49} A recent US study found the factorial structure of the JSE-S varied between preclinical and clinical medical students. Such analysis was beyond the scope of our study.⁴¹

The shared variance between the scales and subscales found in this study supported the view that the scales measure different but related constructs. This view is further supported by the correlation results which revealed only weak correlations despite an

expectation of moderate correlations, particularly in respect of subscale scores of IRI-PT and JSE-PT and IRI-EC and JSE-CC. Multiple linear regression models similarly suggested that all IRI subscales were weak predictors of the JSE-S subscale scores and total score, with IRI-EC being the strongest predictor of the JSE-S total score.

The study supports the view of gender differences in respect of empathy with women recording higher scores on self-report measures.

The suggestion that the two scales measure different but related constructs has implications for medical education, and medical education research. Care is needed in comparing studies using different scales. Conflicting results of studies of the trajectory of empathy during undergraduate medical education may, in part, be attributable to the use of instruments which are not comparable.^{33, 39} Similar implications may apply to intervention studies.

The suggested difference between the two scales points to the need to clarify the constructs being measured. Whereas the IRI measures generic empathy, the JSE-S may measure some idealized view of an empathic doctor-patient relationship. This distinction is reflected in differences in the wording of the scales. The IRI asks respondents the extent to which each statement “describes” his or herself, with all items containing the words “I” or “me”. The JSE-S asks respondents for their level of agreement with statements about either how “doctors” should behave or the doctor-patient relationship, with only 4 items relating to the individual.

The IRI and JSE-S were conceived with different populations in mind. Generic empathy may be shaped by personality, certain life experiences and possibly culture. Studies in various cultures suggest that psychological conditions exert the largest influence.⁴² As an idealized view of an empathetic doctor-patient relationship JSE-S scores may be shaped by cultural influences affecting both medical education and patient expectations.

⁴⁹ These may be more amenable to training and education than IRI scores.⁵⁰ Studies examining the impact of educational interventions aimed at enhancing empathy have found a larger increase in JSE-S scores than in IRI scores.²² However, such idealized views may also be more vulnerable to the hidden curriculum.¹⁶

To characterize and clarify how the IRI and JSE-S constructs relate to each other, and how they change during medical education there is a need for more studies using both instruments, for more qualitative and mixed methods work and for more longitudinal work. If, as suggested, the JSE-S measures context specific empathy then greater attention needs to be paid to that context, including details of medical course content and structure and perhaps, critical incidents. Our study only included undergraduate students. Comparable studies of post graduate medical students and/or physicians are needed.

This is one of the few studies of medical students using both the IRI and JSE-S and to the authors' knowledge the only study to include European, Brazilian and New Zealand data. One of its strengths is the large number of participants drawn from five countries. Whilst sample size in each country differed this was not a major limitation since an objective of the study was to explore the latent structure of IRI and JSE-S. A limitation is that the analyses were run on the 24-item version of the IRI and did not include age per se. Our study drew data from countries with essentially "European" values which may partly explain the absence of marked cultural differences. Studies comparing the IRI and JSE-S among medical students in countries with very different cultural backgrounds, particularly those in which extreme scores have been recorded, would be valuable in identifying differences between generic empathy and what is perceived to be an appropriate empathetic doctor/patient relationship.⁴²

Conclusions

The factor analysis undertaken in this study supports the accepted factorial structure of the IRI and JSE-S and reaffirms the relationship of their respective subscales to the underlying dimensions of empathy: affective and cognitive, and for the IRI self-oriented versus other-oriented. These results are enhanced by being confirmed in five countries. However, this study suggests that the IRI and JSE-S are structurally different, weakly related concepts: the former generic or dispositional empathy, the latter context specific empathy. Consideration of this distinction may give rise to implications for medical education and may have implications for patient care. There is a need for more studies using both instruments, involving students at different stages in their medical education, and for more longitudinal and qualitative studies in order to understand the practical implications of this distinction.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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